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PREFACE.

THE addition of a greater number of very respectable persons as Members of the Society during the last Session than in many preceding, shews in a strong point of view the high estimation in which this Society stands with the World, at a period of forty-six years from its formation. The number of Candidates yet offering themselves, makes it appear that the ardour for improvements in the Arts, Manufactures, and Commerce of Great Britain and her Colonies, continues to act vigorously on the mind; and a consideration of the infinite advantages which the Public have derived from this Society, affords the pleasing prospect of its flourishing to the remotest ages.

The Funds of the Society have this Session received an addition of five hundred pounds from the legacy of the late Robert Nettleton, Esq. of Camberwell, whose portrait, from respect to his memory, the Society have ordered to form the Frontispiece of the present Volume.—They have also directed the following short account of the life of this excellent character to be added.

"Mr. Nettleton was born at Hull, about the year 1694. His Father was a respectable merchant there, and successively discharged the offices of Chamberlain, Sheriff, and Mayor, in that town. He had a brother named James, who was a merchant at Stockholm, and perished by a remarkable accident, being blown up in a merchant-ship lying there, on board which the British factory were dining to celebrate the King's birth-day. Mr. Nettleton, on his first entrance into business, resided at Konigsberg in Prussia, and afterwards removed to St. Petersburg, where he was personally known to

to Peter the Great, its illustrious founder; from thence he came to settle in London, about the year 1735.

Blessed with a good natural understanding, improved by a classical education, he was conversant with the best Greek and Latin authors, and attentive to mathematical and other scientific studies. In all his transactions, he was most upright and honourable; in his turn of mind, calm and benevolent; warmly interested for the welfare of his country, kind and hospitable to his friends, and of so bountiful a disposition to the poor, that, during the whole course of his business, he set aside a tenth part of his profits for the purposes of charity; which plan he so much extended in his latter years, as to give away a fourth, or even a larger portion of his income.

Being related to the family of the famous Andrew Marvel, Esq. and desirous of recommending that patriotic character

to the imitation of other men, he placed a marble tablet to his memory in the church of St. Giles's in the Fields.

Mr. Nettleton presided for 25 years as Governor of the Russia Company in London, and was for some years a Director of the Bank of England; in which situations his disinterested conduct and distinguished moderation gained him the good opinion and respect of all persons with whom he had any intercourse.

Mr. Nettleton married Anne, one of the daughters of Sir Edward Becher, who was Lord-Mayor of London in 1729, by whom he left no issue: he died in July 1774, and lies interred in the parish of Camberwell.

He left by his will a certain sum of money to be invested in the stocks, as a part of the provision for his Widow; and after her death, he bequeathed £3,500 thereof to the following public charities and institutions:

The

The Small-pox Hospital	£.1000 0 0
Merchant Seamen's Corporation	1000 0 0
London Hospital	500 0 0
St. Thomas's Hospital . .	500 0 0
The Society for the encouragement of Arts, Manufactures and Commerce, of which he had been early a Member	500 0 0

The Widow of Mr. Nettleton survived him until the month of November, 1799; and, on her decease, the above-mentioned legacies were discharged by his remaining executor and trustee, Thomas Raikes, Esq. of New-Broad-Street, London.

A character so respectable as that of Mr. Nettleton will long be admired by posterity, and venerated by his countrymen.

The business of the Society, during the last Session, suffered some interruption by the loss of their late worthy Secretary, Mr. SAMUEL MORE, who died on the 11th of October, 1799, less a martyr to age than to infirmity, being worn out with almost perpetual attacks of the

gout, with which he had been for many years very heavily afflicted. His unwearied zeal for the interests of the Society, his great abilities in the execution of an office to which he had been enthusiastically devoted for near 30 years, and his extensive knowledge of every subject connected with the Institution, are well known, and must be gratefully acknowledged.

There is great reason to believe that some of the first Mechanicians and Manufacturers of this country have at different times been indebted to him for useful hints and observations. It is not proposed to enter here into the biography of this very excellent Officer, whose private worth was not inferior to his public virtues, because it is expected that a full account of him will be prefixed to the publication of some valuable papers, which, it is said, he has bequeathed to the World. He was buried in a family vault, belonging to the Chapel in the Broad-Way, Westminster, in the parish of

of St. Margaret's. His executors are George Philips Towry, Esq. one of the Commissioners of the Victualling-Office, and William Newcombe, Esq. of the Bank.

The loss of a man so able and so long-experienced in office, was naturally attended with some little embarrassment to the Society, more particularly as the election of his successor did not take place for some months after his decease; but the active exertions of Mr. Thomas Taylor, the assistant Secretary, well known for his endeavours to disseminate the Philosophy of Plato, aided by the voluntary assistance of the late Mr. George Wilson, of Bedford-street, Covent Garden, prevented impediments to the business of the Society.

The subsequent death of Mr. Wilson, who united the accomplishments of the gentleman and the scholar with the offices of friendship, will long call forth a tributary sigh from every person who was favoured with his acquaintance. No

man

man ever had a greater regard for the Society, or was more attentive to its honour and its interest.

The present Secretary to the Society was elected in February last, but was scarcely called to active business till the month of March. His entrance upon this office will naturally be considered an arduous undertaking, when the merits and comprehensive abilities of his predecessor are remembered; but some candour and indulgence, on such an occasion, he certainly has a right to claim from the Society and the Public. In this and other kingdoms, he has had the opportunity to investigate such matters as are the peculiar objects of the Society; and his mind appears to be strongly impressed with a wish to discharge the duties of his office with propriety, energy and attention.

The death of the late Secretary, unavoidably occasioned some delay in the publication of the present volume. The arrangements of it will be found in nearly the

the same order, as in preceding years, and the Premiums not much different: some alterations in them are proposed to take place in the next Volume; and the patrons of the arts, and all ingenious men, are requested to address to Mr. Charles Taylor, the present Secretary of the Society, any hints of new Premiums for objects beneficial to the British Empire.

It is to be remembered, that the establishment of the Society is not on narrow views, or selfish interests. The series of Paintings by Mr. Barry, and the Models for which Premiums have been given, are open to public inspection *gratis*, and the grand object of the Society is the public good.

Under the class of Agriculture, will be found two new Premiums, this year, of very material consequence; namely, one for Spring-wheat, class 88; the other for early Beans, class 91. When the uncertainty of our climate is considered, and the frequent difficulties which the farmer meets with in getting his seed properly

perly in the ground in the autumn, or early winter months, it will be judged of great importance to learn the best methods of producing good crops from wheat sown in the spring season, and to ascertain the kinds most proper for the purpose. The Premium for Horse-beans is intended to point out the earliest varieties, with a view to allow as much time as possible to render land in good condition, for wheat to be sown thereon the same year. Upon similar well-grounded principles, the true spirit of agriculture is encouraged, extended, and improved.

In the department of Mechanicks, Class 218 *, the Premium for cleansing Chimneys, which had been some years omitted, will be found renewed. The great number of miserable objects which the late Mr. George Wilson, above mentioned, had met with in his practice, whose disorders and infirmities he had traced to their source, and found to originate from the common methods of sweeping

sweeping chimneys by children, called forth his usual philanthropy to seek out for some invention to answer the purpose, and to be less injurious to mankind. It is hoped that the Society's effort at this time will be successful.

The papers and communications of the present Volume are in general disposed in the usual manner, under their respective classes. The three last Papers, under the title of Additions in Agriculture, were thus placed, because the accounts had not been fully completed by the Gentlemen who presented them, before the preceding articles in some of the other Classes had been printed off.

Under the class of Agriculture, at the commencement of the Volume, it will be found that the Right Honourable the Marquis of Titchfield has made great and very commendable exertions in planting Acorns.

Thomas Johnes, Esq. has been very successful in planting Larch-trees: few trees are more generally useful, or more durable

durable than the Larch. It is to be observed, that this Gentleman has not confined himself to this kind of timber only; but has entered into an immense extent of general plantations, of which it is probable notice will be taken at a future period.

The communication of the Rev. William Smith, on the planting of Timber-trees, will be found clear and satisfactory: it is pleasing to announce, that the great national object of raising timber has been lately much attended to in other parts of the kingdom.

Orchardists will receive much valuable information from Mr. Lake's paper, which contains an accurate detail of practical knowledge on the subject of Orchards.

Mr. John Cartwright's paper upon the culture of Beans and Wheat, well deserves attention, both from the mode of execution, and because such a system of agriculture precludes the necessity of losing a crop by a summer fallow; the beans

beans leaving the land in a state fit for wheat to be sown thereon the same year.

The culture and qualities of English Rhubarb are fully ascertained by the account furnished by Mr. Thomas Jones on this subject.

The mode of improving Waste Moors has been laid down with great judgement and discrimination in Mr. John Mirehouse's paper on the cultivation of Waste Land, and will form a good example to be followed in similar circumstances. The mind is here naturally led to consider the immense benefit which would accrue to this nation, if attention were paid to the general improvement of the waste land in Great Britain. It may be proved, from actual observation, that there is no land, however in appearance sterile or unfavourable, but is capable of great improvement, at a less expence than is generally conceived. In this case it becomes highly necessary to judge from comparison

comparison, what are the best articles for growth in particular soils and situations, to observe the natural products of the soil, and to take Nature by the hand in her several operations. It must have given peculiar pleasure, to have lately witnessed, in several parts of this kingdom, large crops of wheat and oats waved by the gentle breeze, in varied forms, upon lands which had been deemed inaccessible morasses, or had remained uncultivated for ages.

It is earnestly wished that similar examples may become objects of universal attention and imitation.

The improvements of the Rev. H. B. Dudley, in gaining Land from the Sea, appear to have been conducted with great judgment, and contribute, upon the principles above mentioned, to the advantages of this kingdom.

Mr. Jones, in his paper upon Opium, has clearly proved that Opium of excellent quality may be produced in Great Britain. His observations confirm experiments

periments, which had been previously made upon a smaller scale by Dr. De Salis.

Whatever the public opinion may be upon the benefits likely to arise to this country, from cultivating Poppies in England, for the production of Opium, yet it is well to have clearly ascertained that they will yield here large quantities of good Opium.

At the head of Mechanicks, the late Mr. Bowes's discovery of a Quarry of Mill-stones in Wales, resembling the French Burrs, is of material consequence, especially on consideration of the precarious situation of this country, when lately dependent upon France for so necessary an article. True national policy will always endeavour to produce within the limits of our own country, whatever is necessary for our maintenance and support.

The public attention has been much engaged about the acquisition of a Flour-mill, so constructed as to enable Families

or small Villages to grind their own corn at little expence. Those persons who reside in the country, at a distance from a common Corn-mill, know the necessity of such an invention; and to such, it is expected the Hand-mill invented by Mr. Thomas Rustall will be found of great importance.

The Bolter invented by him, and which is also described, will not only answer the purpose of separating flour from bran, but will be very advantageous to Colour-makers, Druggists, and others in those branches of business where articles of value require to be sifted, or where noxious particles should be avoided in the operation.

The management of heat has been lately a topic of general conversation, and many attempts have been made to improve Ovens, and to save Fuel.

The Oven lately invented by Mr. Holmes, is well adapted for economy, and the service of private families. The

Society

Society have been very attentive to examine its advantages, by repeated experiments, the results of which have declared much in its favour. It is not sufficient, in mechanical inventions, that they will succeed with care; it is also necessary that no additional trouble shall arise to the servants employed about them; otherwise the best inventions will be liable to miscarry. No previous preparation is required in the management of Mr. Holmes's Oven, no extra fire to be made underneath it, or flues to be cleared from smoke and ashes.

If once well fixed in brick-work, it heats with the morning fire, and retains during the whole day, by its contact with the common fire, sufficient heat for general culinary purposes. It will probably be deemed as essential to a family kitchen as the most common utensils there.

The repeated accidents which arise to horses drawing loaded carts, have induced

the Society to consider the means of preventing them; and with this view they have inserted Mr. John Snarts's invention, which will also afford some advantages, by admitting an additional extent to the body of the cart for loads which require room.

A very ingenious Chest-lock, by Mr. Arkwright, will be found to deserve the public notice, it being one of the best means hitherto devised for securing property against picklocks or unfaithful servants.

Mr. Bullock's Lever Lock-bolt is peculiarly well contrived for folding-doors, and for saving trouble to domestics.

The great dangers which arise to passengers in carriages, from horses taking fright, occasioned a Premium to be offered for preventing such accidents: this called forth the ingenuity of Mr. Davis, who, by very curious mechanism, has contrived to detach the horses instantly when required from carriages, and to

stop

stop at the same time the motion of the fore-wheels.

Mr. Clulow's figured Ribband-loom will suggest improvements in the manufacture of Ribbands; many other ingenious contrivances in the figured line of weaving have been completed in other parts of the kingdom.

The astonishing inventions of his Grace the Duke of Bridgewater, on his Canals, are beyond the conceptions of those persons who have not been eye-witnesses to their powers and effects. The Rev. H. Egerton has obligingly favoured the Society, this year, with a description and plan of that stupendous undertaking, the subterraneous inclined plane, projected by, and executed under the immediate inspection of his Grace.

The memory of his Grace will ever be respected as the founder of Inland Navigation in this kingdom; and his clearness of understanding, and strength

of

of mind, have enabled him to conquer difficulties deemed insuperable.

In testimony of great respect for his Grace's merits, the Society have, this Session, presented to him their Gold Medal, thus inscribed: *To his Grace the Duke of Bridgwater, for his great exertions in Inland Navigations.*

It is scarcely credible to what an extent of noble emulation the Society have from time to time given rise, or to form a sufficient estimate of the numerous advantages which the public have ultimately derived from them.

The works of a Barry and a Bacon, which decorate the great Room of the Society, are examples of these exertions. The bold enterprise of Mr. Mackenzie, in traversing the wilds of North America, related in this Volume, is a similar instance in another line of trial; and many others could be adduced.

Under the head of Additions in Agriculture, Mr. Bucknall's paper, relative

to

to the causes of Blight on Fruit-trees, may be considered as a continuation of that series of observations on Orcharding, which that indefatigable and attentive Gentleman has for many years furnished to the Society: the present paper throws much light on the destructive powers of insects.

The observations by Mr. John Taylor, upon the Beet-plant, and the best methods practised in Germany, for extracting Sugar from its root, became an object of the Society's attention, from a consideration of the various purposes, in Arts and Manufactures, to which its leaves, its juices, and its roots, can be applied. It is a material branch of the Society's institution to elucidate the advantages which Great Britain actually does possess, or to point out such as she may procure within herself, without being dependent upon Foreign Nations; and in this view the culture of the Beet-plant may be of great consequence.

The

The very valuable Paper received from Mr. Wakefield, on the powers of Steam, in promoting Vegetation, contains a minute detail of many curious facts, extremely interesting to the naturalist, along with an accurate plan of a Steam-House constructed in the manner he recommends. A variety of remarks on the theory of this process, which have been communicated by him to the Secretary, are at present omitted, owing to the Volume containing already a greater quantity of letter-press than usual, and the account now given being of itself considerable in extent.

Mr. Wakefield's general knowledge in agriculture and horticulture is exemplified by accurate practice, and admirably illustrated by his extensive improvements upon Trafford-moss, near Manchester, which will be found well worthy the inspection of those persons who visit that neighbourhood.

Amongst a variety of information on different subjects received by the Society, but

but not inserted in the present Volume, the Rev. W. Hoskins's discovery of an Iron-mine in Cornwall, the Ore of which is proper for making excellent Steel, should not pass unnoticed. By Mr. Hoskins's account, this Ore contains from 25 to 30 per cent. of iron, much argillaceous earth, small quantities of gold, silver and copper, and a little calcareous earth: he stated that the specific gravity of the iron is in the proportion of 7,654, estimating water at 1000; that he knew no other English Ore capable of producing Steel equal to his specimens; that the metal retains its malleability, whether hot or cold, and was in either case equally tough; that the mine extends superficially above five acres, is within 3 feet of the surface, and in a load from 40 to 60 feet in depth. In support of his observations, he laid before the Society various excellent steel instruments, made from this iron, and authentic certificates of its merit.

Before this summary account of the transactions of the Society is concluded, it is proper to notice the death, in August last, of the worthy and ingenious Mrs. Montague, who had been a member of the Society above fifteen years.

The present Session has added some Ladies of great merit to the list of Members; and, doubtless, more will wish to be elected, when it is remembered that female accomplishments have been long favoured by the attentions and rewards of the Society. The funds of the Society are in a flourishing state; and the ingenious of both sexes, and of every description, are invited to lay their inventions or improvements before the Society, who extend their liberality far beyond the objects published in their list of Premiums. True merit will ever meet with their patronage and encouragement; and the names of those persons whose endeavours receive their sanction, will be handed down to posterity, as contributors to the public welfare of their country.